MELAG

Operating manual

for the autoclaves

MELA*tronic*®15EN

MELA*tronic*®17EN

MELA*tronic*®23EN

with device software version 3.33 ff.

Dear Doctor:

Thank you very much for the trust which you have shown by purchasing this autoclave.

For more than 50 years now, MELAG — a medium-sized family-owned and -operated company — has specialized in the production of sterilization equipment for medical practice. During this period, MELAG has succeeded in becoming a leading manufacturer of sterilization equipment. More than 355 000 MELAG units sold throughout the world testify to the exceptional quality of our sterilizers — which are manufactured exclusively in Germany.

As all other MELAG products, this autoclave was manufactured and tested according to strict quality criteria. Before placing this unit into operation, please read this Operating Manual carefully. The long-term functional effectiveness and the preservation of the value of your autoclave will depend on careful preparation of instruments before sterilization, and on proper care of the unit.
The staff and management of MELAG

CE 0124

To ensure the functional effectiveness of this unit and to preserve its value:

1. Prepare the instruments to be sterilized carefully
2. Take proper care of the autoclave
3. Use only pure distilled or demineralized water

CONTENTS

1 DESCRIPTION OF THE UNIT 4
1.1 Views of the unit 4
1.2 Control - Panel 5
1.3 Technical data 6
1.4 Performance features of this autoclave 6
1.4.1 Conformity to european standard 6
1.4.2 Fractionated Gravity system 6
1.4.3 Operating range for sterilization 6
1.4.4 Integrated steam generation 6
1.4.5 One-way / Closed-loop system / Conductivity measurement 7
1.4.6 Electronic Parameter Control EPS 7
1.4.7 Pre-heating / Drying 7
1.4.8 Documentation 7

2 INSTALLATION 8
2.1 Setting up the autoclave 8
2.2 Transport ribbons 8
2.3 Levelling 8
2.4 Mains power supply 8
2.5 Filling the water storage tank 8
2.6 Connecting the external Condensate container (option) 9

3 INITIAL START-UP 9
3.1 Initialising the printer 9
3.1.1 Connecting the external MELA*print*® 42 printer 9
3.1.2 Initialising the printer / Immed. print-out? Yes/No 9
3.2 Test run 9
3.3 Safety instructions 10

4 INSTRUCTIONS FOR ALL STERILIZATION PROCEDURES 10
4.1 Electricity and water supplies 10
4.1.1 Feed water aqua dest / aqua dem 10
4.1.2 Power supply 11
4.2 Preparing instruments for sterilization 11
4.3 Loading the autoclave 12
4.4 Closing the door 13
4.5 Program selection 13
4.6 Program start 14
4.7 Program progress 14
4.8 Print-out record 15
4.9 Removing the sterilized items 16
4.10 Sterile storage / Drying 16
4.11 Sterilization frequency / pauses 16
4.12 Manual termination of program 17
4.12.1 Termination of sterilization 17
4.13 Reaction to warnings / error messages 18
4.14 Operational pauses 18

5 CLOSING DOWN / TRANSPORT / REINSTALLATION 18

6 SPECIAL FUNCTIONS 19
6.1 Water quality (conductivity) / Chamber preheating temperature 19
6.2 Records / Load documentation 19
6.2.1 Record print-out 19
6.2.1.1 External Printer 19
6.2.1.1.1 Connecting the external printer MELA*print*®42 19
6.2.1.1.2 Initialising the printer 20
6.2.1.2 Connection to an external PC 21
6.2.1.2.1 Installation 21
6.2.1.2.2 Initialising the file transmission to the PC 21
6.2.1.3 No printer 21
6.2.2 Immed. print-out? Yes / No 21
6.2.3 Printing out stored records 22
6.2.4 Print all stored cycle records 23
6.2.5 Display printer memory status 24
6.2.6 Deleting cycle records 25
6.2.7 Test print-out 26
6.3 Setting date and time 27
6.4 Automatic preheating 28
6.5 Total batch counter 29
6.6 Program modifications 29

7 OPERATORS FAULTS/ MALFUNCTIONS 30
7.1 What to do if the autoclave malfunctions 30
7.2 Malfunctions without display messages 30
7.2.1 No Display 30
7.2.2 Door locking function 30
7.2.3 Leaks in the door 30
7.2.4 Excessive water consumption 30
7.2.5 Poor drying 31
7.3 Warning messages 31
7.4 Malfunction messages 33

8 TAKING CARE OF YOUR AUTOCLAVE 36
8.1 Preparation of instruments 36
8.2 Rust formation = Drag-in rust 36
8.3 Taking care of the MELA*tronic*®15EN, 17EN and 23EN 37
8.3.1 Cleaning the autoclave 37
8.3.2 Instructions for checking and caring for the door and door-lock components 38
8.3.3 Use of demineralized or distilled water 39
8.4 Checking the operation of the autoclave 39
8.4.1 Safety with automatic monitoring 39
8.4.2 Periodical bacteriological testing (twice a year) 39
8.4.3 Maintenance recommendations 39

9 ANNEX 40
9.1 Capacity / Weight 40
9.2 Performance of the sterilization programs according to EN 13060 40
9.3 Additional technical data 41

1 Description of the unit

1.1 Views of the unit

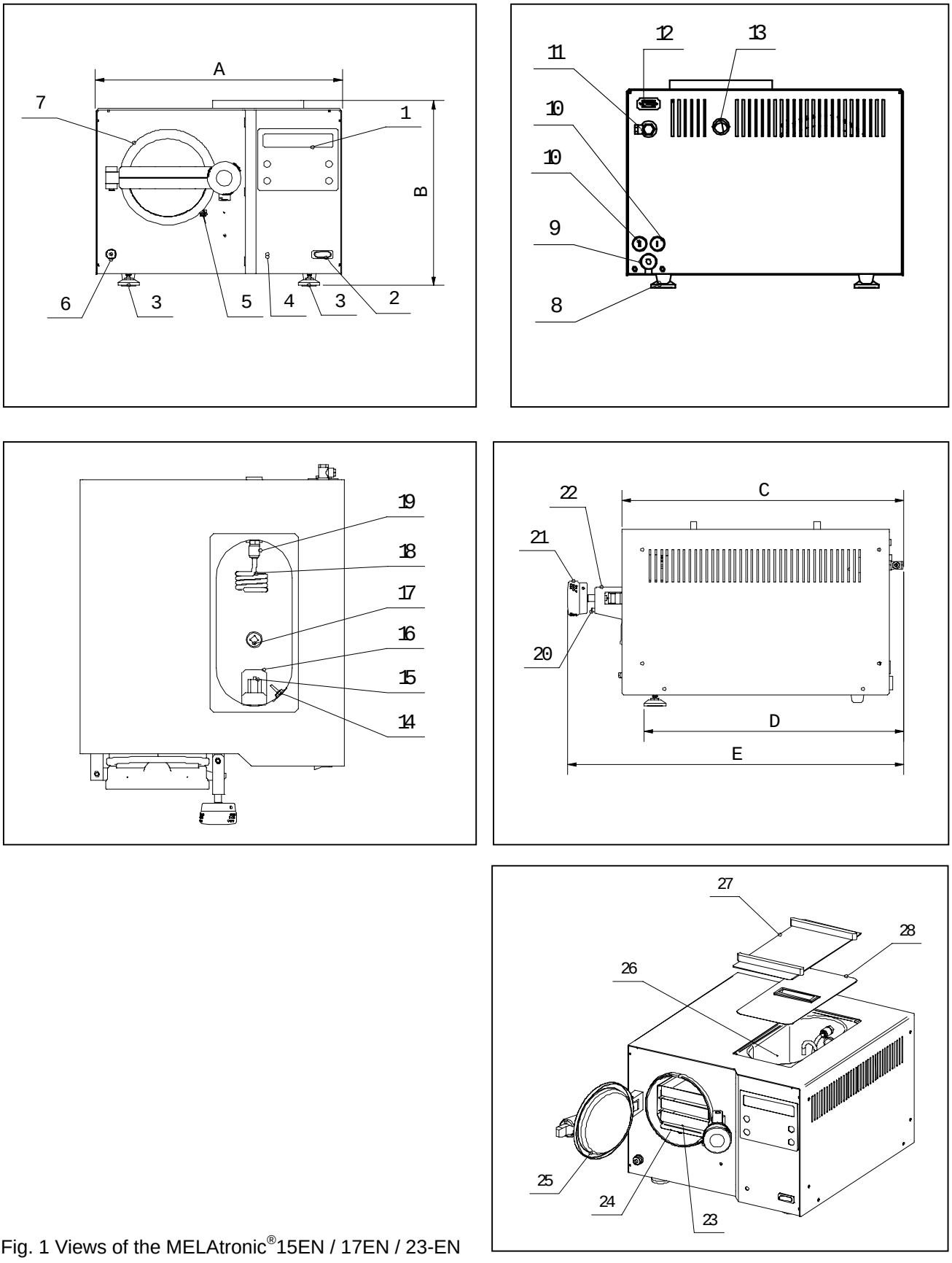


Fig. 1 Views of the MELAtronic®15EN / 17EN / 23-EN

Pos.		Pos.	
1	Operation panel	**15**	Safety valve
2	Power switch	**16**	„MAX“- mark
3	Adjustable front feet	**17**	Water supply filter
4	Reset bottom for the overheating protection of the steam generator	**18**	Condensate loop „Pressure release“
5	Door contact switch	**19**	Connector for condensate loop
6	Water drain tap	**20**	Door locking bolt
7	Door	**21**	Door grip
8	Back feet	**22**	Locking latch
9	Mains power cable	**23**	Tray
10	Fuses: 2 x 16 A / FF	**24**	Tray mount
11	Connector for external condensate container	**25**	Door gasket
12	Serial data and printer port (RS 232)	**26**	Water storage tank
13	Aeration of the water storage tank	**27**	Housing cover with slides
14	Conductivity sensor	**28**	Lid of water storage tank

Dimensions

	Width	**Height**	**Depth C**	**Depth D**	**Depth E**
MELA*tronic*®15EN	43.5cm	32.5cm	50cm	46cm	62.5cm
MELA*tronic*®17EN	46cm	35cm	54.5cm	51cm	67cm
MELA*tronic*®23EN	52cm	38cm	58.5cm	55cm	71cm

1.2 Control - Panel

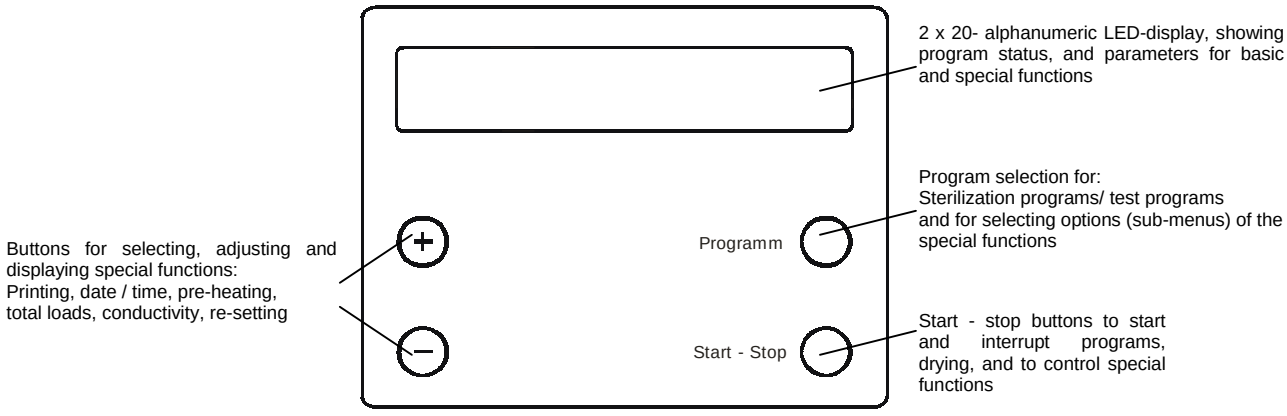

2 x 20- alphanumeric LED-display, showing program status, and parameters for basic and special functions
Program selection for:
Sterilization programs/ test programs
and for selecting options (sub-menus) of the special functions
Buttons for selecting, adjusting and displaying special functions:
Printing, date / time, pre-heating,
total loads, conductivity, re-setting
Programm
Start - Stop
Start - stop buttons to start and interrupt programs, drying, and to control special functions

Fig. 2 Control panel of MELA*tronic*®15EN / 17EN / 23-EN

1.3 Technical data

	MELA*tronic*®15EN	MELA*tronic*®17EN	MELA*tronic*®23EN
Chamber (∅ x Depth), Volume	15 x 38 cm, 7 Litres	18 x 42 cm, 11 Litres	23 x 45 cm, 19 Litres
Electric power supply	230V / 50Hz, 1500W	230V / 50Hz, 1500W	230V / 50Hz, 1600W
Maximum load:			
Instruments Wrapped / unwrapped	2 Kg	3 Kg	4 Kg
Textiles wrapped	100 Gr.	150 Gr.	200 Gr.
unwrapped	150 Gr.	300 Gr.	500 Gr.
Parameters Gentle - Programm	121 °C, 1bar, Sterilization time: 20 min		
Parameters Universal-program , Quick - programm , Prionen - Programm	134 °C, 2bar, Sterilization time: 5 min		

Further technical details are included in the Annex

1.4 Performance features of this autoclave

1.4.1 Conformity to european standard

The autoclaves MELA*tronic*®15EN, 17EN und 23EN fulfill the stipulations of the european standard for Small Steam Sterilizers EN 13060 for autoclaves with sterilization cycle of the type „S“ and „N“ (see section .4.5 and 9.2) .
Regarding the sterilization performance the autoclaves MELA*tronic*®15EN, 17EN and 23EN are usable for the sterilization of unwrapped and solid instruments, for the sterilization of single wrapped solid instruments and also for the sterilization of small amounts of single wrapped textiles. Thermo – electrical Tests according EN 13060 and additional bacteriological tests have approved this perfomance.

1.4.2 Fractionated Gravity system

With the fractionated gravity system which is used steam flows into and then out of the autoclave to ensure effective penetration of the items to be sterilized by saturated steam.
This makes it possible to carry out demanding sterilization tasks rapidly and reliably, such as for example the sterilization of wrapped instruments or textiles.

1.4.3 Operating range for sterilization

The autoclaves MELAtronic®15EN, 17EN and 23EN feature three sterilization programs for temperatures at 134°C: the “Universal Program” (for wrapped objects), the “Prion Program” (a special Universal Program), the “Quick Program” for unwrapped items. The “Gentle Program” is a sterilization program for textiles and rubber articles at 121°C.

1.4.4 Integrated steam generation

The powerful steam generation in the sterilization chamber makes it possible to sterilize large loads of instruments or textiles in a short time. This system of steam generation means that excess temperatures in the sterilized chamber are not possible.

1.4.5 One-way / Closed-loop system / Conductivity measurement

The autoclaves MELAtronic®15EN, 17EN and 23-EN operate in the standard installation mode, as a circulatory water system. This means that the water evaporated during each sterilization process is condensed and returned to the water storage tank. This takes place during sub-atmospheric pulsing, and during pressure release. This type of operation is effective for sterilization rates of approx. 2 … 3 sterilization cycles per work day, if sufficiently long pauses between sterilization are observed. In work with a circulatory water system, however, it is very important to ensure that the instruments to be sterilized have been especially carefully cleaned and rinsed before sterilization. In addition, the water should be checked for dirt and debris every day, and the water must be changed at least once a week.
If the sterilizer is used often, the water in the water storage tank becomes extremely hot, so that complete condensation in the tank is not possible, and steam will exit from the vent openings (Fig. 1, Pos. 13) on the back wall of the autoclave. Under these conditions, an external condensate tank (MELAG article no. 00356) can be connected to the autoclave, and the condensing coil (Fig. 1, Pos. 18) can be removed from the water storage tank. The autoclave will now operate with a single-use (non-reusable) water system, and the evaporated water for each sterilization will be condensed in the external condensate tank. This configuration has the advantage that the water in the storage tank will not become too hot, and the steam will not be ejected from the autoclave. Another advantage of this installation alternative is that impurities dissolved in the steam will not get into the water of the storage tank – and this means that clean distilled or demineralized water will once again be used for sterilization in the following program cycle.
An integrated electrical conductivity sensor monitors the quality of the demineralized or distilled water used to generate the steam. Using the recommended one-way operation for the autoclave, the increased consumption of demineralized or distilled water can be provided by using a water purifier such as the MELA*dem*®40, MELA*dem*®47 or the MELA*dest*®65.
Provided that the instruments are prepared carefully for the sterilization, stains on the load and soiling of the autoclave itself can be prevented.

1.4.6 Electronic Parameter Control EPS

The microprocessor used in the MELA*tronic*®15EN, 17EN and 23EN makes it possible to monitor pressure, temperature and time continuously during a program by Electronic Parameter Control The overall operating time can then be optimised according the load and the temperature of the autoclave.
The process assessment and monitoring system in the program control compare current process parameters with standard process data and monitors the process relative to limit values for temperatures, times and pressures. This makes it possible to identify faults as they occur, and provides quality assurance for the sterilization process.

1.4.7 Pre-heating / Drying

By activating the "pre-heating" function, the cold autoclave chamber can be warmed up before sterilization, or the temperature can be maintained between sterilization runs. This reduces the duration of cycles and considerably reduces the formation of condensation, thus improving drying results with slightly opened door.

1.4.8 Documentation

The memory of the electronic control system stores records of the previous 40 programs.
For effective hard-copy documentation and for checking purposes a MELA*print*®42 printer can be connected to print out a record immediately after completion of a program, or to print out records from the memory.
By connection of a PC, the program MELA*win*® can also transfer the records to the PC, for permanent archiving of all results, and for printing out these results as needed.

2 Installation

2.1 Setting up the autoclave

The autoclave should be set up in a dry place which is protected against dust.
The base should be stable, and able to support the weight of the autoclave. At the same time, the work surface must provide convenient access to the autoclave, and the display must be clearly visible.
The space required by the autoclave can be seen from the external dimensions (as in Section 1.1). A minimum additional space of 5 cm should be allowed on either side and above the autoclave in order to ensure that heat can escape. If the additional condensate container shall be connected to the autoclave you need an adequate space below the autoclave for the container.
The electrical power supply should be a separate 230V AC circuit with a 16 A fuse and optionally protected with a 30 mA circuit breaker.
Should it be decided at some stage to install an automatic one-way water system, it is necessary to connect the condensate container as an option. The condensate container must stand below the autoclave and the outlet pipe must be without bends and twists which could prevent water flowing out freely.
For the supply with demineralized / distilled water from the integrated water storage tank (Fig. 1 Pos. 26) you need at least a space of 30cm or more above the autoclave.

2.2 Transport ribbons

Take the autoclave out of the packaging by means of the transport ribbons. The blue ribbons themselves are each removed by undoing two retaining screws, which must then be screwed firmly back in place without washers. Therefore you need the TORX-key, delivered with the autoclave

2.3 Levelling

In order to ensure that the autoclave will work reliable, the autoclave should be installed in a horizontal position (this should be checked with a spirit level at the chamber flange) as shown in the pictures below.

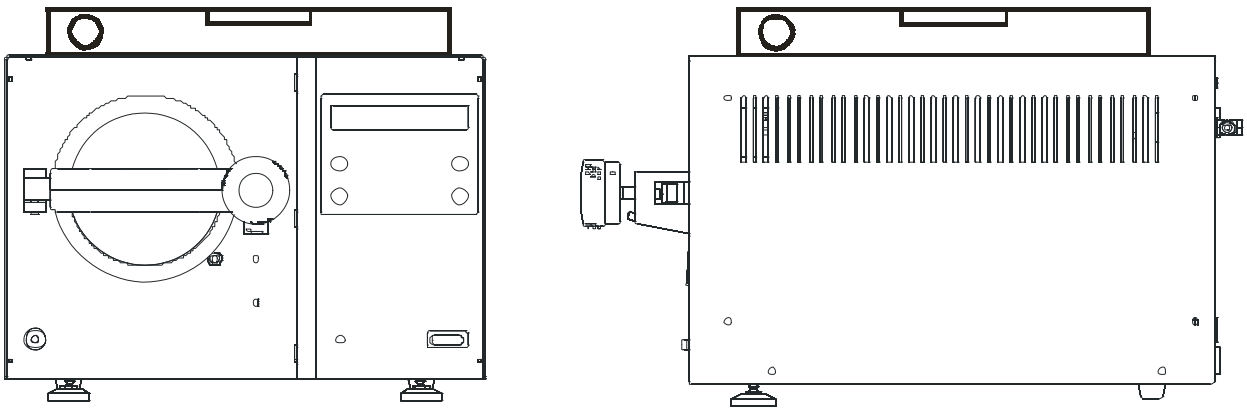


Fig. 3 Levelling the autoclave with a spirit level

2.4 Mains power supply

The electric cable of the appliance is plugged into a mains socket rated at 230 V, 50 Hz. The power rating of the MELA*tronic*®15EN and the MELA*tronic*®17EN is 1500W, of the MELA*tronic*®23EN 1600W. In order to avoid overloading the electricity supply, we recommend using a separate electrical circuit fitted with a 16 A fuse and optionally protected with a 30 mA circuit breaker.

2.5 Filling the water storage tank

Remove the lid of the housing (Fig.1 Pos 27) and the lid of the water tank (Fig.1 Pos. 28) below. Fill the water tank with ca. 3 Litres of aqua dest / aqua dem. Do not fill more water into the tank than up to the "MAX" mark (Fig.1 Pos. 16). The cooling coils in the water storage tank should always be covered with water. This will allow the steam flowing out to condense. It will also prevent and problems from the steam, and will eliminate excessive consumption of distilled or demineralised water. For this reason, be sure to top up with distilled or demineralised water as soon as necessary. Or, better: drain out the remaining water through the water drain tap (Fig. 1, Pos. 6) and refill with fresh distilled or demineralised water up to the MAX mark.

2.6 Connecting the external Condensate container (option)

To operate the autoclave with a single-use (non-reusable) water system (one-way system), and to avoid discharge of steam during frequent sterilization work, an external condensate tank (MELAG article no. 00356) can be connected to the autoclave. This external condensate tank is not part of the equipment provided originally with the autoclave. Please proceed as follows to connect the condensate tank to the autoclave:
Remove the blind cap from the connection point for the external condensate tank (Fig. 1, Pos. 11), on the back wall of the autoclave. Connect the drain pipe (supplied with the external condensate tank) to the connection point, and tighten it securely with the coupling ring. Fill up the external condensate tank up to the MIN mark with ordinary tap water, and place the tank under the autoclave.
Insert the free end of the drain pipe, as far as it will go, onto the plug-on coupling in the top of the external condensate tank. The drain pipe should not have any kinks or dips, and it should lead continuously downward (without any upward loops).
Finally, remove the condensing coil for the pressure release (Fig. 1, Pos. 18) in the water storage tank. Remove this coil by pressing toward the rear the locking ring of the plug-in connector for the condensate loop (Fig. 1, Pos. 19). After removing this coil, store it safely where you can find it easily.

3 Initial start-up

3.1 Initialising the printer

3.1.1 Connecting the external MELA*print*®42 printer

In order to document the progress of the sterilization programs, the printer MELA*print*®42 can be connected to the MELA*tronic*®15EN / 17EN / 23EN. This printer is not included by delivery.
For the connection of the printer to the autoclave see section 6.2.1.1.1.

3.1.2 Initialising the printer / Immed. print-out? Yes/No

The initialising of the external printer (Registration in the electronic of the autoclave) is described in section 6.2.1.1.2. For the selection " Immed. print-out? Yes (Preferred selection, after a cycle the print-out is made automatically) see the description in section 6.2.1.3.

3.2 Test run

In order to check the operation of the autoclave under realistic conditions, a test run should be carried out with the "Universal Program, 134°C wrapped" and a relevant load. After loading the autoclave and selecting the program with the "Program" button, sterilization is started by pushing the "Start/Stop" button. If the program runs correctly, the following message will appear on the display (see Section 4.7):

Universal-Program
Run sucessfully

with the values for the maximum values for pressure and temperature. If the immediate printout option has been selected for an external printer a record of the program run will be printed.

3.3 Safety instructions

- When opening the door, particularly after interrupting the drying process, residual steam can escape from the autoclave chamber.
- After opening the door, do not touch any metal surfaces - these will be hot! Danger of burns. Always use the tray lifter to remove trays, or wear suitable hand protectors when taking out other items.
- IMPORTANT: If you connect an external condensate tank to the autoclave, be sure to remove the condensing coil for pressure relief (Fig. 1 Pos. 1) from the water storage tank. Check the level of water in the condensate tank every day, and empty this tank to prevent water from overflowing and causing damage to the room. IMPORTANT: There is no automatic monitor for the level of condensate water.
- The appliance is not suitable for sterilizing liquids.
- Under current VDE-regulations, this appliances is not suited for use in areas where there are risks of explosion.
- The appliance must only be serviced and repaired by MELAG or by its authorised representatives (specialist dealers or customer services) using only original parts and following service instructions.
- Before opening the housing always disconnect from the mains power supply!
- In order to ensure effective sterilization with the autoclave observe the instructions in this operating manual, and in particular ensure that the loading of the autoclave is appropriate for the program selected.
- This device is designed to be operated outside the patient's surroundings. This means that there must be an interval of at least 1.5 metres between the device and the area where patients are being treated, or where they otherwise stand or sit.
- If error messages repeatedly occur during operation of the autoclave, then do not use the autoclave until it has been repaired by authorized service personnel.
- If the power cable is damaged, do not use the autoclave. Call authorized service personnel and have them replace the damaged cable by an especially prepared cable.

4 Instructions for all sterilization procedures

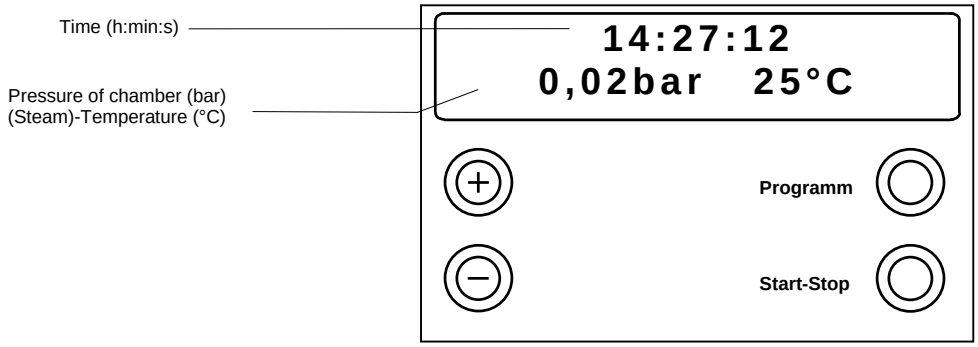
4.1 Electricity and water supplies

4.1.1 Feed water aqua dest / aqua dem

The autoclave automatically monitors the availability of cooling water and purified water, as well as the quality of the distilled / demineralized water before starting a program.
In order to allow an immediate program start and to avoid error reports or interruptions of programs check before the first sterilization at the start of the working day, that the internal water supply has sufficient water in the water storage tank. If necessary, refill with water of appropriate quality (see Section 8.3.3).
Before the first sterilization the quality of the feed water has to be checked by pressing the button „-“ after the autoclave is switched on. Is the conductivity of the water higher than 65 µS/cm, the feed water has to be exchanged and fresh aqua dest / aqua dem has to be filled into the water storage tank..
If the water storage tank is dirty, the water has to be drained and the water storage tank must be cleaned bevor refilling the tank with fresh aqua dest / aqua dem (see also section 8.3.3).

4.1.2 Power supply

Switch on the power using the switch on the front of the autoclave (Fig.1 Pos.2). The autoclave is in the start status:



4.2 Preparing instruments for sterilization

MELAG - rust-free materials
All parts of the MELA*tronic*®15EN / 17EN / 23EN which come into contact with steam are made on non-rusting materials: the pressure chamber and the door of stainless steel, steam pipes of Teflon, and screws and magnet-valves of bronze.

Film rust
The use of these materials means that no parts of the autoclave can initiate rust formation. Where rust does attack the autoclave or instruments sterilized in it, tests repeatedly show that this has been brought into the autoclave on instruments (film rust).
Even top-quality stainless steel instruments can form rust if they are not handled properly, e.g. if they are treated with the wrong chemical cleaning or disinfecting agents.

Preparing items for sterilization
The example of the formation of film rust shows how important it is to prepare items properly before sterilization.
Handpieces and contra-angles must be cleaned before sterilization and maintained (e.g. by oiling).
Other instruments must be disinfected and cleaned immediately after use in accordance with UVV/VBG 103, or similarly strict national codes of practice in a disinfectant and / or cleaning solution at the correct concentration for the correct length of time.
MELAG recommends the use of cleaning aids such as ultrasonic baths, cleaning and maintenance equipment for handpieces for contra-angles, as well as thermo-disinfecting devices.
It is essential that the instruments are well cleaned in order to avoid dirt and contamination being separated from the load in the autoclave and clogging filters, valves, and nozzles. In particular locks, joints, and hinges must be cleaned thoroughly with a brush before sterilization. No traces of cleaning and disinfecting agents should be allowed to enter into the sterilization chamber of the autoclave, since this can give rise to corrosion! The instruments should be swilled off with demineralized water and then dried off before being loaded in the autoclave. Turbines and handpieces must be oiled in accordance with the manufacturer's instructions in order to ensure their long working life.

Brand-new instruments
The cleaning procedures described above must also be followed before sterilizing brand-new instruments. These often carry small amounts of grease, oil and soiling from the manufacturing process.
Important: Carefully follow all instructions provided by manufacturers of instruments for the preparation of their products for first-time sterilization and for subsequent sterilizations.

4.3 Loading the autoclave

It is of crucial importance for effective sterilization and good drying that the autoclave is loaded properly: In the annex you will get information how to load the autoclave.
When loading the autoclave, take account of the following points:

Tray rack

Normally, the autoclave should be used in conjunction with a tray rack, since this ensures that steam penetration and drying are as good as possible. In exceptional situations (e.g. when using sterilization containers from other manufacturers), and after consultation with your specialist dealer or with MELAG, the tray rack can be removed and the container can be placed directly in the autoclave chamber.

Trays

Trays for objects which are to be sterilized must be perforated, in order to get safe sterilization results and to allow condensation to run away. MELAG-trays are recommended. If you use dishes or trays without perforations, then the sterilization will not be safe and the autoclave will not dry properly.

Enclosed sterilization containers

Enclosed sterilization containers must be perforated on at least one side (preferably underneath) or must have valves, in order to ensure that steam can penetrate and condensate can run out. All MELAG-sterilization containers meet these requirements with perforations on two sides and filter-cloth- inlays.
Sterilization containers which only have perforations on the top only allow limited drying and are not for the use in the MELA*tronic*®15EN / 17EN / 23-EN
If sterilization containers are stacked in the autoclave, it is important to ensure that the perforations are not blocked.

Transparent sterilization packaging

If you use transparent sterilization packaging, such as MELA*fol*®, then the items should if possible be stood vertically on the tray. For the MELA*tronic*®15EN the foil holders (MELAG-Art.-No.: 00283) should be used. The packagings should never be laid flat one on top of the other.
If seals split open during sterilization it may be necessary to increase the length of the impulse on the sealing device or to use a double-seal.
Standard tray-cassettes sealed in MELA*fol*® (250 mm wide) must be taped and clasped additionally to ensure that the side-seals do not split open.

Maximum loads

Do not exceed the maximum loads of the autoclave.

Mixed loads

If mixed loads of textiles and instruments are to be sterilized, then as far as possible the textiles should be above the instruments and direct contact with the instruments should be avoided.
Inclusion of textiles and instruments in the same sterilization container is not desirable.
Textiles should never come into direct contact with the walls of the chamber.
If different types of packaging are included in a load, then:

- Instruments and sterilization containers should be at the bottom
- Transparent and paper sterilization packaging should be at the top (but lower than textiles)

Liquids

The appliance is not suitable for the sterilization of liquids!

Suitability for sterilization

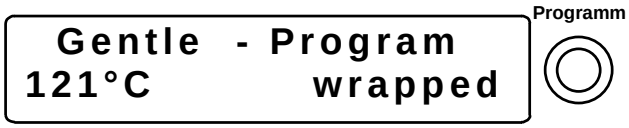
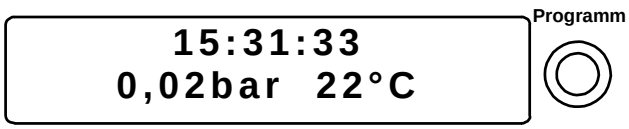
Relevant information provided by manufacturers of instruments and textiles about sterilization should be strictly observed.

4.4 Closing the door

The door is closed by putting the door latch over the door beam and turning the door grip until the door is closed. The display shows the message:

4.5 Program selection

A program should be selected which is appropriate for the physical properties of the items being sterilized (and in particular their heat resistance) and the type of packaging (if any part of the load is wrapped, then either the "Universal Program" or the "Gentle Program" must be used).
By pressing the "Program selection" button it is possible to review the display of the following programs for selection:

Program name/Display message	Parameter/Application
	Universal program at 134°C, 2 bar, and a sterilization time of 3.5 min for the sterilization of wrapped items, in particular solid instruments (no hollows), or mixed loads (unwrapped / wrapped). The maximum loads in section 1.3 must not be exceeded.
	Quick Program at 134°C, 2 bar and a sterilization time of 5 min for the sterilization **only of unwrapped and solid instruments** (no hollows, no textiles) for rapid re-use (drying can be interrupted manually). The maximum loads in section 1.3 must not be exceeded.
	**Gentle Program** at 121°C, 1 bar, sterilization time 20 min for the sterilization of all types of wrapped and solid instruments items (no hollows), textiles or thermolabile materials (plastic, rubber), or mixed loads (wrapped/unwrapped) The maximum loads in section 1.3 must not be exceeded.
	Prion Program (a special Universal Program) at 134°C, 2 bar, and with sterilization time extended to 20 min, for sterilization of wrapped items, especially instruments and/or mixed loads (i.e., packed and unpacked). This program is recommended for sterilization of instruments used in situations in which the danger of infection by pathologically modified proteins is suspected: for example, Creutzfeld-Jacob and BSE). The maximum loads in section 1.3 must not be exceeded.
	**Basic display** (no program selected)

4.6 Program start

Press the "Start-Stop" button once the desired program is shown on the display. The availability of feed water will be checked automatically, with a conductivity measurement.

At the start of the quick program there will be an additional message "Warning: Only unwrapped instruments". This message must be acknowledged by pressing "Start" again.

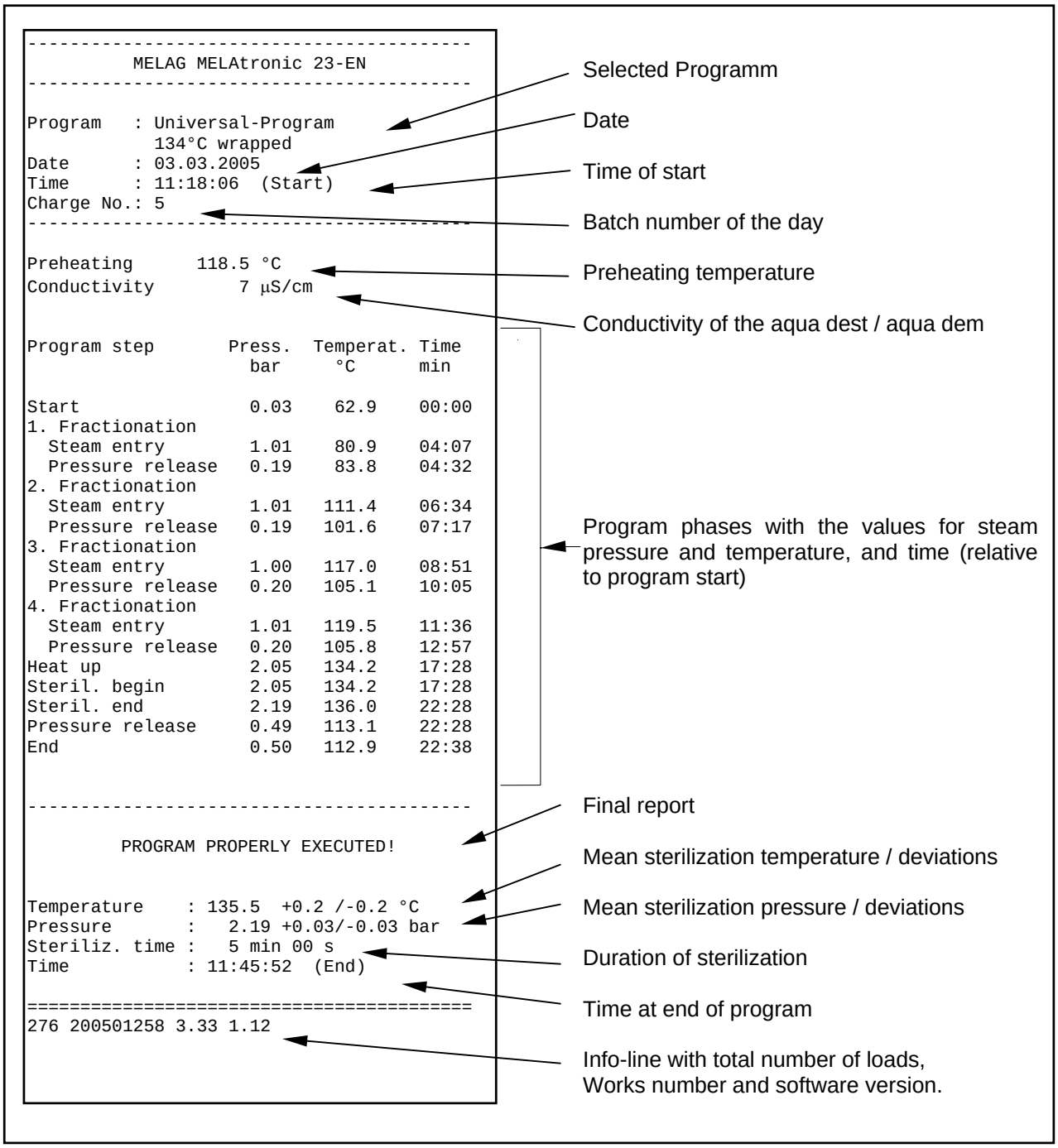
4.7 Program progress

After starting the program, it will then progress automatically. The display shows the current program status as follows:

Program status		Display message
1.	**Phase 1 and following** Depending on the program chosen and the temperature of the chamber at the start of the program, a number of cycles of steam inflow and outflow follow to ensure adequate penetration of super-heated steam into the items being sterilized.	1. Fractionation 0,69 115°C
2.	**Heating phase** A heating-up phase follows. The continuous introduction of steam raises pressure and temperature in chamber to the values needed for the program	Heat up 1,80 bar 117°C
3.	**Sterilization phase** When the required pressure and temperature have been reached the sterilization proper then begins. The display shows alternately the pressure and temperature and the time remaining.	Sterilization 2,18 bar 135°C Sterilization noch 2 min, 12s
4.	**Pressure release** After completion of the sterilization time, the pressure is released and the steam generator emptied. Pressure and temperature fall.	Pressure release 0,85 bar 96°C
6.	**Program end** After ventilation of the chamber the program is completed. After the unlocking of the door you can open the door. If a printer is attached and print-out "yes" is selected, the record will be printed-out immediately.	Universal - Program Run sucessfully Door Open please

4.8 Print-out record

The print-out record contains the following information:


MELAG MELAtronic 23-EN
Program : Universal-Program
134°C wrapped
Date : 03.03.2005
Time : 11:18:06 (Start)
Charge No.: 5
Preheating 118.5 °C
Conductivity 7 µS/cm
Program step Press. bar Temperat. °C Time min
Start 0.03 62.9 00:00
1. Fractionation
Steam entry 1.01 80.9 04:07
Pressure release 0.19 83.8 04:32
2. Fractionation
Steam entry 1.01 111.4 06:34
Pressure release 0.19 101.6 07:17
3. Fractionation
Steam entry 1.00 117.0 08:51
Pressure release 0.20 105.1 10:05
4. Fractionation
Steam entry 1.01 119.5 11:36
Pressure release 0.20 105.8 12:57
Heat up 2.05 134.2 17:28
Steril. begin 2.05 134.2 17:28
Steril. end 2.19 136.0 22:28
Pressure release 0.49 113.1 22:28
End 0.50 112.9 22:38
PROGRAM PROPERLY EXECUTED!
Temperature : 135.5 +0.2 /-0.2 °C
Pressure : 2.19 +0.03/-0.03 bar
Steriliz. time : 5 min 00 s
Time : 11:45:52 (End)
276 200501258 3.33 1.12
Selected Programm
Date
Time of start
Batch number of the day
Preheating temperature
Conductivity of the aqua dest / aqua dem
Program phases with the values for steam pressure and temperature, and time (relative to program start)
Final report
Mean sterilization temperature / deviations
Mean sterilization pressure / deviations
Duration of sterilization
Time at end of program
Info-line with total number of loads, Works number and software version.

4.9 Removing the sterilized items

After opening the door the sterilized items can be removed.
Be careful when removing the sterilized items! Touching the metal surfaces can lead to burns. Always use the appropriate aids to lift the trays (MELAG-tray lever, standard tray-lifter) or wear suitable hand protection.

4.10 Sterile storage / Drying

After removing wrapped sterile items, the wrapping should be checked for any signs of damage. If it is defective (e.g. split seals) then the sterilization of the items must be repeated after the items have been re-wrapped.
It is important for sterile storage that the items have been properly dried. The MELA*tronic*®15EN / 17EN / 23EN provide very good drying if the program has not been interrupted before its completion and the autoclave has been properly loaded (see Section 4.3). Directly after sterilization there may still be residual condensation on the items or the container. Because the items are hot on removal, this will usually evaporate quickly. The German industrial standard DIN 58953 Part 7 Section 7 contains the following comment about residual moisture on paper wrapping or transparent sterilization paper after sterilization: "...small amounts of water on the wrapping are unproblematic, provided they have evaporated within 30 minutes after removal from the steam sterilizer....."
After cooling, wrapped sterilized objects should be stored in a place where they are **protected from dust** (e.g. instrument cupboard). Given proper storage, DIN 58953 Part 7 gives the following guidelines for the maximum storage periods for sterilized objects: in basic wrapping (e.g. transparent sterilization foil) up to 6 weeks; in double-wrapping up to 6 months.

4.11 Sterilization frequency / pauses

After a sterilization cycle, the autoclave can be reloaded and started immediately. However, continuous operation can lead to increased development of water vapour from the aeration rifle at the back of the autoclave housing. This is not harmful for the MELA*tronic*®15EN / 17EN / 23EN provided there is sufficient space around it for ventilation and it is not fully enclosed (e.g. in a cupboard). In order to reduce formation of water vapour it is advisable to connect the external condensate container.

4.12 Manual termination of program

4.12.1 Termination of sterilization

A program can be terminated at any time by pressing the "Start-Stop" button. If the program has not yet reached the drying phase then the items will be **non-sterile!**
Warning! Steam may escape when the autoclave door is opened.
If the sterilization phase of the program had not been completed, then it is advisable to carry out an empty sterilization run before reusing the autoclave.

Operation		Display message
1.	Press the "Start-Stop" button To confirm, press the "Start-Stop" once again within 5 seconds. If no confirmation is given then the program resumes normally.	**Stop program?** **Press ‚STOP‘**
2.	If confirmation is given then the program stops. The pressure inside the autoclave will then be equalised by pressure release.	**Program** **stopped** **Pressure release** **1.52 bar 112°C**
3.	After pressure equalisation, the display will alternately show the messages "Terminated" and an offer to quit the program termination.	**Stop / End** **0,02 bar 88°C** **Acknowledge** **with ‚-‘**
4.	To acknowledge the program termination, press the " **-** " button. After a short time the door is unlocked and the display shows the selected program.	**Universal - Program** **121°C wrapped**

4.13 Reaction to warnings / error messages

The MELA*tronic*®15EN, 17EN and 23 EN have a number of safety features and an extensive integrated control and monitoring system, in order to ensure the greatest possible level of safety for the sterilization process, and to eliminate risks for the patients and operators.
Various aspects of the operation of the autoclave, such as pressure and temperature sensors are automatically checked when the autoclave is switched on.
The quantity and quality of the feed water is checked before each program start.
A successful program start is followed in the next stages by the monitoring of all parameters of relevance for the sterilization. If any limit values for the individual program phases are exceeded then there is a malfunction report and the program is automatically interrupted.
In addition to messages, warnings or malfunction reports on the display, if a printer is connected then a print-out will provide details of the type of malfunction and when it occurred.
If any such warning message occurs then you should consult Section 7, which provides detailed advice and possible operational errors.

4.14 Operational pauses

In general, the door should only be leant to during operational pauses in order to reduce wear on the door seal and to avoid premature failure or sticking.
In the event of longer breaks, such as during vacations, the water storage tank should be drained. If the condensate container is connected, the container should be emptied, too.

5 Closing down / Transport / Reinstallation

When closing down and transporting the autoclave you should proceed as follows:

- Switch off the power.
- Disconnect from the mains, allow the autoclave to cool down.
- Empty the internal water storage tank.
- Disconnect and empty the condensate container, if connected.
- Fasten the transport ribbons to the autoclave.
- If transporting the autoclave with trays and tray rack assemblies in place, then protect the inside surface of the door by including a sheet of foam or similar material.
  - **Warning! To avoid damage use the original packaging when transporting the autoclave. If the appliance may be exposed to frost in transit then follow the relevant service instructions!**
- When setting the appliance up for reuse after transport or repairs then proceed in accordance with Sections 2 and 3.

6 Special functions

6.1 Water quality (conductivity) / Chamber preheating temperature

By repeatedly pressing the "-" button, the preheating temperature of the chamber and the conductivity of the purified feed water used for steam generation can be displayed alternately.

Operation		Display message
1.	Press down the "-" button to display the conductivity of the feed water µS/cm	Conductivity 15 µS/cm
	Release the "-" button to return to the basic display (as shown here) or the program status	14:27:12 0,02bar 25°C
	Press the "-" button repeatedly and hold down: Display shows the pre-heating temperature of the chamber.	Temp_Preht_Chamb. 120°C

6.2 Records / Load documentation

In order to document the progress of the sterilization program, then the processor memory stores records of the last 40 cycles. These records can be downloaded at a later stage via the serial interface (RS232).
When the memory is full (40 program runs) then before the start of the next run the oldest record will automatically be overwritten. If an external printer is connected (and operable) and the option "Immed. print-out? No" has been selected, then confirmation will be requested before the oldest record is overwritten (see Section 7.3).
Hardware details and the nature of the print-out documentation is provided in the following sub-sections.

6.2.1 Record print-out

6.2.1.1 External Printer

6.2.1.1.1 Connecting the external printer MELA*print*®42

In order to connect a printer to the autoclave then a printer cable should be connected between the 9-pole socket on the front of the autoclave (see Fig.1 Pos. 3) and the 25-pole on the back of the printer (ensuring a good connection and tightening the locking screws).
The power supply to the printer is provided by the power unit supplied with the printer, which connects to the socket on the rear of the printer.
The printer is ready for operation when the voltage lamp "P" shines and the status display (On line / Off line) "SEL". The operating manual of the printer includes further details, including the assembly of an external paper feed, inserting paper, and the general operation of the printer.

6.2.1.1.2 Initialising the printer

After connecting the printer to the autoclave it must be registered with the autoclave processing unit (initialised). Proceed as follows:

Operation		Anzeige am Display
1.	Switch on autoclave Display shows: 1. Line: Time 2. Line: Pressure of chamber Temperature inside chamber	**14:27:12** **0,02bar 25°C**
2.	Hold down "+" button and also press "-" button. The "Function"-menu with the sub-menu "Print" is shown	**Function:** **Print**
3.	Press "Program" button, Select "Print" menu sub-menu "File transmission »	**Print** **File transmission**
4.	Press "Program" button, Select "File transmission" Display shows current status e.g. "No printer"	**File transmission** **No printer**
5.	Press "+" (or "-") button until display shows "External printer"	**File transmission** **External Printer**
6.	Press "Program" button, Confirm the setting, return to "Print" menu	**Print** **File transmission**
7.	Press "Start-Stop" button, return to the "Function" menu	**Function:** **Print**
8.	Press "Start-Stop" button, Quit the "Function" menu and return to the initial display	**14:27:30** **0,02bar 25°C**

6.2.1.2 Connection to an external PC

6.2.1.2.1 Installation

Records and archives can also be kept by using an external PC. This requires a suitable connection between the serial port of the PC and the printer port of the autoclave.
For data transfer and data processing to a PC you must first install the program MELA*win*® on the PC.

6.2.1.2.2 Initialising the file transmission to the PC

When the autoclave has been connected to the PC the file transmission of the autoclave has to be set on "External PC". The initialising of this has to be done as described in section 6.2.1.1.2 but under 5. the selection "External PC" with the buttons "+" or "-" has to be made.

6.2.1.3 No printer

In order to select the option "No printer", proceed as described as in Section 6.2.1.1.2. Under Point 5, however, use the "+" or "-" button to reach the setting "No printer".

6.2.2 Immed. print-out? Yes / No

When an external printer is fully installed, a print-out can be produced automatically at the end of each program run by selecting the following options after switching on the autoclave:

Operation		Display message
1.	Hold down "+" button and also press "-" button. Select "Function" menu, sub-menu "Print"	**Function:** **Print**
2.	Press "Program" button, Select "Print" menu sub-menu "File transmission"	**Print** **File transmission**
3.	Press "+" button, select sub-menu "Immed. print-out?" Display shows current option, here e.g. "No"	**Immed. Printout** **No**
4.	The button "Program" can be used to switch between "Yes" and "No" Press "Program" button, Select "Yes" option	**Immed. Printout** **Yes**
5.	Press "Start-Stop" button, Confirm the setting and return to "Function" menu, sub-menu "Print"	**Function:** **Print**
6.	Press "Start-Stop" button, Quit the "Function" menu and return to the initial display	**14:27:30** **0,02bar 25°C**

6.2.3 Printing out stored records

When an external printer is fully installed, a print-out of selected records from the memory can be produced by selecting the following options after switching on the autoclave:

	Operation	Display message
1.	Hold down "+" button and also press "-" button. Select "Function" menu, submenu "Print"	Function: Print
2.	Press "Program" button, Select "Print" menu, submenu "File transmission"	Print File transmission
3.	Press "+" (or "-") until the submenu "Print last cycle" appears on the display	Last cycle print: no. 40
4.	Press "Program" button, the cycle record number flashes	Last cycle print: no. 40
5.	To select another number, press the "-" or "+" button until the right number is reached, e.g. here No. 25	Last cycle print: no. 25
6.	Press "Program" button to start the print-out of the selected record, (or to terminate press "Start-Stop" and return to the "Function" menu)	Printout
7.	If you wish to print further records then return to Point 4, or...	Last cycle print: no. 40
8.	... to terminate press "Start-Stop" and return to the "Function" menu	Function: Print
9.	Press the "Start-Stop" button to return to the initial display	14:27:30 0,02bar 25°C

6.2.4 Print all stored cycle records

In order to print-out all stored cycle records (with a fully installed external printer) then select the following options after switching on the autoclave:

	Operation	Display message
1.	Hold down "+" button and also press "-" button. Select "Function" menu, submenu "Print"	**Function:** **Print**
2.	Press "Program" button, Select "Print" menu, submenu "File transmission"	**Print** **File transmission**
3.	Press "+" (or "-") until the submenu "Print all cycles" appears on the display	**Print** **all cycles**
4.	Press "Program" button to start the print-out of all the stored records (up to 40!), or to terminate press "Start-Stop" and return to the "Function" menu (Once printing has started termination is only possibly by switching off the power!)	**Print**
5.	When the print-out is complete, the display again shows the submenu :	**Print** **all cycles**
6.	Press the "Start-Stop" button to return to the "Function" menu...	**Function:** **Print**
7.	...and then press "Start-Stop" again to return to the initial display	**14:27:12** **0,02bar 25°C**

6.2.5 Display printer memory status

With a fully installed external printer, the status of the printer memory can be displayed as follows::

Operation		Display message
1.	Hold down "+" button and also press "-" button. Select "Function" menu, submenu "Print "	Function: Print
2.	Press "Program" button, Select "Print" menu, submenu "File transmission"	Print File transmission
3.	Press "+" (or "-") button until the display shows the memory status, e.g.:	Allocated: 40 Free: 0
4.	Press the "Start-Stop" to return to the "Function" menu	Function: Print
5.	and press "Start-Stop" again to return to the starting display	14:27:12 -0,02bar 25°C

6.2.6 Deleting cycle records

In order to delete cycle records (e.g. in the event of the warning message "Printer memory full", with the option "Immed. print-out? No", selected (see Section 7.3), then after switching on the appliance proceed as follows:

Operation		Display message
1.	Hold down "+" button and also press "-", Select "Function" menu, submenu "Print"	Function: Print
2.	Press "Program" button, Select "Print" menu, submenu "Data transfer".	Print File transmission
3.	Press "+" (or "-") until the display shows "Delete all cycles".	All cycles delete
4.	Press the "Program" button to delete all records (or press "Start-Stop" to terminate).	Allocated: 0 Free: 40
5.	Then press "Start-Stop" to return to "Function" menu...	Function: Print
6.	...and press "Start-Stop" again to return to the starting display	14:27:12 -0.02bar 25°C

6.2.7 Test print-out

In order to check the printer and its connection to the autoclave, a test print-out can be made as follows:

Operation		Display message
1.	Hold down "+" button and also press "-", Select "Function" menu, submenu "Print"	Function: Print
2.	Press "Program" button, Select "Print" menu, submenu "File transmission"	Print File transmission
3.	Press "+" (or "-") until the display shows "Test print-out"	Test print-out
4.	Then press the "Program" button for a test print-out (or press "Start-Stop" to terminate)	Print-out
5.	Then press "Start-Stop" to return to the "Function" menu	Function: Print
6.	and press "Start-Stop" again to return to the starting position	14:27:12 -0,02bar 25°C

6.3 Setting date and time

The date and time can be reset if necessary (e.g. winter time / summer time) as follows:

Operation		Display message
1.	Hold down "+" button and also press "-" button. Select "Function" menu, submenu "Print"	Function: Print
2.	Press "+" (or "-"), until the display shows the submenu "Date/Time".	Function: Date / Time
3.	Press "Program", the display shows the current hour (24-hour clock) (here for example 17.00)	Date / Time Hour : 17
4.	by pressing the "+" (or "-") button the following options can be selected	Date / Time Minute : 23 Date / Time Second : 13 Date / Time Day : 14 Date / Time Month : 05 Date / Time Year : 19
5.	After finding the required option, e.g. "Minute", press the "Program" button and the current value flashes	Date / Time Minute : 23
6.	Press "+" or "-" to increase or reduce the value:	Date / Time Minute : 28
7.	Press "Program" to confirm the new value, which then stops flashing. If more adjustment are necessary, return to Point 4 and begin again,...	Date / Time Minute : 28

Operation		Display message
8.	...or press "Start-Stop" to return to the "Function" menu, and	Function: Date / Time
9.	Press "Start-Stop" again to return to the starting display	14:27:12 -0,02bar 25°C

6.4 Automatic preheating

The MELA*tronic*®15EN / 17EN / 23EN have a preheating function by means of which the autoclave chamber can be heated to the necessary temperature before a program starts, or can be maintained at this temperature between cycles. This not only shortens the time for each cycle but also reduces condensation on the walls of the chamber which helps to provide very good drying performance.
If the automatic preheating is activated, then this begins as soon as the power is switched on.
In the default setting on delivery the automatic preheating is on.
The current setting for the automatic preheating can be changed as follows:

Operation		Display message
1.	Hold down "+" button and also press "-" button. Select "Function" menu, sub-menu "Print"	Function: Print
2.	Press "+" (or "-") until the display shows the submenu "autom. preheating".	Function: auto. preheating
3.	Press "Program", and the display shows the current option, here "Preheating Yes"	auto. preheating Yes
4.	Pressing the "Program" button now alternates between the options "Preheating Yes/No", here e.g. "No"	auto. preheating No
5.	When the desired option has been selected press "Start-Stop" and return to the "Function" menu, then...	Function: auto. preheating
6.	...press "Start-Stop" again to return to the starting display	14:27:12 -0,02bar 25°C

6.5 Total batch counter

The MELA*tronic*®15EN / 17EN / 23EN have a counter of the total number of cycles that have been started, and this be displayed as follows:

Operation		Anzeige am Display
1.	Hold down "+" button and also press "-", select "Function" menu, submenu "Print"	**Function:** **Print**
2.	Press "+" (or "-") until the display shows the submenu "Sum batch number".	**Function:** **Sum batch number**
3.	Press "Program", the display shows the current total load count, e.g.:	**Sum batch number** **367**
4.	Close by pressing "Start-Stop", and return to the "Function" menu, then	**Function:** **Sum batch number**
5.	Press "Start-Stop" again to return to the starting display	**14:27:12** **-0,02bar 25°C**

6.6 Program modifications

The standard programs are designed to meet most practical operational needs (pulsed flow, heating, sterilization, pressure release, drying, and ventilation) and to display the parameters of most interest (pressure, temperature, time).
The operator is responsible for ensuring that the autoclave is not overloaded, and that the load is arranged properly to ensure good drying.
There are two standard options "Automatic preheating" and "Additional drying".
Any further program modification to suit specific individual requirements should only be carried out by authorised personnel, after consultation with your dealer or with the experts at MELAG.

7 Operators faults/ Malfunctions

7.1 What to do if the autoclave malfunctions

If the autoclave does not seem to be working properly (e.g. poor drying, warnings, or error reports) then follow these instructions in order to exclude possible operational errors. Following these instructions continue to work with the autoclave. If the malfunction occurs repeatedly then contact our dealer, and authorised MELAG customer service or contact MELAG directly. You should describe the problem precisely and include the works number of your appliance.

7.2 Malfunctions without display messages

7.2.1 No Display

After switching on the autoclave, the display should show the initial setting .

If there is no display: Check:

1. Is the power cable plugged into the mains?
2. Is the mains supply OK.? (if necessary check with another appliance).
3. Exchange the two power fuses (Fig. 1, Pos. 10) on the back of the autoclave as following: Disconnect the power cable and remove the screw cap over the fuses using a screwdriver or a coin. Exchange the fuses (two reserve fuses are delivered with the autoclave) then replace the screw cap and reconnect the autoclave to the power supply. If there is still no display when the autoclave is switched on, or if the display blacks out repeatedly, please inform your specialist dealer. If you exchange the fuses, order two new spare fuses through your dealer (MELAG-Art. No. 57592).

7.2.2 Door locking function

The autoclaves MELA*tronic*® 15EN, 17EN, and 23EN are equipped with an electric door-locking function. This function will disable the twist handle of the door lock during the sterilization program, and after occurrence of any malfunction (until the malfunction has been acknowledged by the operator). This door-locking function is also effective if no power is supplied: this means than the twist handle will also be blocked if necessary, even after the autoclave has been switched off. After the power switch is turned back on, and at the end of a program, the system will automatically pull the door locking bolt (Fig. 1 Pos. 20) to the rear – which will release the twist handle.

In certain positions of the twist door handle, the door locking bolt may jam and it cannot be pulled to the rear. The operator will notice this when a quiet hum or buzzing sound can be heard. This is not a malfunction. To release the locking bolt, simply turn the twist handle slightly.

If the locking bolt repeatedly blocks the twist handle, then report this fault to your specialist dealer or authorized service personnel.

7.2.3 Leaks in the door

If – after the start of the program, and upon beginning of pressure build-up – leaks in the door occur and steam discharges from the door area, then proceed as follows: Check the door gasket and the collar of the sterilization chamber for dirt and debris. Clean if necessary. If the door gasket is visibly damaged, replace it. Before starting a program, be sure to turn the door handle tightly and securely lock the autoclave – regardless of the display (even if “Door closed” appears).

If you cannot stop the leak by the above measures, then report this fault to your specialist dealer or authorized service personnel.

7.2.4 Excessive water consumption

The autoclave can be operated in a mode with a water-circulation system. This means that an external condensate tank has not been connected. Any loss of water in this mode will be the result of evaporation losses by incomplete condensation in the water storage tank. This loss is caused by very frequent use of the autoclave, and the resulting heating of the water.

When the external condensate tank is connected, the autoclave operates with a single-use (non-reusable) water system. This means that the water used for each sterilization cycle is not condensed and returned to the water storage tank, but is collected in an external condensate tank. In this case, the consumption of water will depend on the program and the loading of the autoclave.

If your autoclave is consuming considerably more water than the amounts given in the attached annex, first check to make sure that the autoclave has been set up perfectly level (horizontal). If the autoclave is level, and if it still uses excessive amounts of water on a long-term basis, then report this fault to your specialist dealer or authorized service personnel.

7.2.5 Poor drying

Good drying depends only on the correct operation of the autoclave, but also on the way the autoclave is loaded. If drying is not satisfactory:

1. Open the door after a sterilization cycle slightly so the load can be dried effectively with the activated preheating function.
2. Check that the autoclave has been set up correctly so that condensate can flow out of the chamber.
3. Check that the condensation outflow is not blocked by dropped, instruments, filter paper, etc. on the floor of the pressure chamber.
4. Check that the maximum load has not been exceeded (particularly for textiles), that the autoclave has been loaded properly (no direct contact with the walls of the pressure chamber), and that the appropriate tray-rack assembly has been used (see Section 4.3).
5. If none of these measures help to reduce water consumption, please inform your specialist dealer.

7.3 Warning messages

For the following warning messages, please observe the comments made and restart the program in question. If the warning occurs repeatedly please consult your specialist dealer.

Warning message	Cause / Remedy
ATTENTION ! **Door open** **No Start possible** **Acknowledge with button „-„**	Door not closed properly • Turn the door grip down until contact is made (display should then show "Door closed")!
ATTENTION ! **No feed water** **aqua dest./dem refill** **No Start possible** **Acknowledge with button „-„**	This message appears when there is too less of aqua dest / aqua dem in the water storage tank • Check the level of water in the tank, and refill to max. with distilled or demineralized water of the appropriate quality
aqua dest./dem bad **aqua dest./dem check supply**	Conductivity of the demineralized or distilled water is above the first limit value, a start is possible by pressing the "Start" button once more: • Empty water from the water storage tank, clean tank with distilled / demineralized water and refill to the MAX- mark with purified water to specifications

Warning message	Cause / Remedy
aqua dest./dem insufficient **No start possible** **Acknowledge with button „-„**	Conductivity of the demineralized or distilled water is above the second limit value, a start of a sterilization cycle is no more possible: • Empty water from the water storage tank, clean tank with distilled / demineralized water and refill to the MAX- mark with purified water to specifications
Printer is not ready	Communication with the printer via the serial interface has been interrupted. This message appears when a report cannot be printed out. It is displayed for 20 seconds. If the printer becomes operational during this period the cycle record prints out: • The autoclave may be operated without a printer. Check under the "Data transfer" menu that the option "No printer" has been selected. (see Section 6.2.1.3) • Check the cable connection between the printer and the autoclave. • Check the power supply to the printer. In the MELA*print*®42 the red light should indicate 'power on' • The printer may be "Offline". Select "online" (MELA*print*®42: press "SEL" button, green LED "SEL" should indicate)
Printer memory full	The internal printer memory is full (40 cycles recorded), an external printer is registered, and in the "Print" menu the option "Immed. print-out? No" is selected. The message is displayed when a program is started. Pressing the "Start / Stop" button again deleted the message and the program starts: • You can continue operations simply by pressing the "Start / Stop" button twice when you start a program. • Select "Immed. print-out? Yes" (see Section 6.2.1.3) • Delete stored records (See Section 6.2.6), if necessary print-out all stored cycle records first (see Section 6.2.4) • In the Data transfer menu, select the "No printer" option (see Section 6.2.1.3)
Please service	The service message is activated after a certain number of loads or a set operating period, when a service is due. The message appears before the start of every program. If you press the "Start / Stop" button again the message is deleted and the program starts. 1. You can continue operations, by simply pressing the "Start / Stop" button twice when you start a program. 2. Have a service carried out as recommended by an authorised MELAG servicing company or your specialist dealer. The cycle counter for servicing is resetted during the service.

7.4 Malfunction messages

Errors are generally reported by an "Error" on the display with the number of the error and its short name.
Error reports may occur without a program start (when the power is switched on or soon after), or during a program.
If errors are reported during a program, then in addition to the error report the program will also be stopped. This may be accompanied by the equalisation of the pressure in the autoclave, and in this case the error message will alternate with the messages "Pressure release", or "Ventilation", and "End".
After the termination, the display will alternately show the error message and "Acknowledge with button ;-'". Until you have quit the error message the autoclave door cannot be opened. If a program has been prematurely terminated in this way the autoclave load must always be regarded as being **not sterilized.** We recommend that you unload the autoclave, carry out a sterilization cycle without any load (the drying may be impaired for this first cycle) and then reload the autoclave and repeat the interrupted operation cycle.
If an external printer is connected and "Immed. print-out? Yes" is selected, a record will automatically be printed out at the end of the termination.
The print-out shows the full name of the error, and if a program has been interrupted before completion it will also show "Load not sterile". The following list gives error reports, the cause and possible remedies.

Malfunction message	Cause / Remedy
Malfunction 2: Steam generator	The monitored time was exceeded not only for the heating-up phases during air removal by sub-atmospheric pulsing, but also for achieving the required sterilization pressure. Causes of this error may be any of the following: • Maximum loading amounts were exceeded. • Reduced heating output, since the mains voltage was too low. Please check the electrical power supply from the building. Try to see if the device works properly when connected to another electrical circuit. • Loss of water as a result of leaks, or from collection of water in porous materials. Do not allow water to collect in the objects to be sterilized: be sure to turn bowls, cups, glasses, and the like upside down **so that their openings are downward**. Cassettes perforated on once side must be turned **so that their perforated side faces downward**. **Important: It is not allowed to use cassettes that are completely closed.** • It is not allowed to sterilize without using tray racks. • After the above possible causes have been eliminated, press the reset button on the device: • **Important: After pressing the reset button, perform a sterilization cycle in the Quick-program with completely empty sterilization chamber.** If the problem continues, notify your specialist MELAG dealer.
Malfunction 4: Pressure release	The monitoring time for the ventilation of the pressure chamber was exceeded: • Check that the pressure releases at the rear of the chamber are not blocked • If this occurs repeatedly, inform your specialist dealer.
Malfunction 8: Time base	Maximum difference between the program duration and the internal clock exceeded: • If this occurs repeatedly, inform your specialist dealer.
Malfunction 9: Door open	Door not closed properly ▪ Turn thedoor grip down until contact is made (display should then show "Door closed")! • If this occurs repeatedly, inform your specialist dealer.

Malfunction message	Cause / Remedy
Malfunction 10: Steamgen. too hot	The capillary tube level regulator is open at the start of the program (error report immediately after start), or the monitoring time until refilling with demineralized or distilled water during the program (until the end of sterilization) is exceeded: • Check the horizontal levelling of the autoclave . • Clean the filter inside the water storage tank • Clean the filters inside the sterilization chamber • After termination of a program and immediate restart of a program this malfunction may occur. Wait for 2 minutes and start the sterilization cycle once more. If this occurs repeatedly, inform your specialist dealer:
Malfunction 18: Sensor defect :No	The internal testing of the sensors for temperature, pressure or conductivity showed an excessive deviation, the error can be reported on switching on the appliance or in the course of a program: • If this occurs repeatedly, inform your specialist dealer.
Malfunction 21: Preheating	The pre-heating has not reached the necessary temperature within the specified time limit: • If this occurs repeatedly select the option "Automatic preheating No" and inform your specialist dealer (see Section 6.4)
Malfunction 22: Overh. Preheating	The maximum preheating temperature was exceeded: • If this occurs repeatedly start the autoclave without preheating and inform your specialist dealer
Malfunction 23: Current	The monitoring time for the pressure release in the outflow process for the fractionating was exceeded: • Check that the flow filter in the chamber (at the bottom directly behind the door) is not blocked • If this occurs repeatedly, inform your specialist dealer
Malfunction 26: A/D-Converter	The limit deviation for internal analog / digital signal conversion has been exceeded: • If this occurs repeatedly, inform your specialist dealer.
Malfunction 29: Battery-RAM	There is a data inconsistency or a data loss in the processing unit memory. This can be the result of a major disturbance to the mains electricity supply or an insufficient battery voltage. On quitting, the clock will automatically reset to 00.00 and the load count will reset to the value from the EEPROM. At the same time all records in the memory will be deleted: ▪ After quitting the error report: Reset time and date (see Section 6.3) and restart. • If this occurs repeatedly, inform your specialist dealer.

Malfunction message	Cause / Remedy
Malfunction 32: Power loss	After starting the program there was a loss of power. The error report is received when the electricity supply is restored: ▪ Check the mains power supply installation, if no errors can be found, inform the service agent.
Malfunction 33: Pressure loss	The time limit for the steam generator to reach the necessary pressure has been exceeded: • If this occurs repeatedly, inform your specialist dealer.
Malfunction 34: Sterilization TU	The minimum sterilization temperature has not been reached: ▪ Reduce the size of the load. • Check the filter inside the chamber (In front on the left side behind the door) if it is dirt or clogged. • If this occurs repeatedly, inform your specialist dealer.
Malfunction 35: Sterilization TO	The maximum sterilization temperature has been exceeded: • If this occurs repeatedly, inform your specialist dealer
Malfunction 36: Sterilization DU	Sterilization pressure falls below the minimum level: ▪ Reduce the size of the load. • If this occurs repeatedly, inform your specialist dealer
Malfunction 37: Sterilization DO	The maximum sterilization pressure has been exceeded: • If this occurs repeatedly, inform your specialist dealer.
Malfunction 38: Sterilization TD	The difference between measured and theoretical temperature is too large: • If this occurs repeatedly, inform your specialist dealer.

8 Taking care of your autoclave

8.1 Preparation of instruments

All parts of the MELAtronic®15EN / 17EN / 23EN which come into contact with steam are made on non-rusting materials: the pressure chamber and the door of stainless steel, steam pipes of Teflon, and screws and magnet-valves of bronze.

Film rust

The use of these materials means that no parts of the autoclave can initiate rust formation. Where rust does attack the autoclave or instruments sterilized in it, tests repeatedly show that this has been brought into the autoclave on instruments (film rust).

Even top-quality stainless steel instruments can form rust if they are not handled properly, e.g. if they are treated with the wrong chemical cleaning or disinfecting agents.

Preparing items for sterilization

The example of the formation of film rust shows how important it is to prepare items properly before sterilization.

Instruments must be disinfected and cleaned immediately after use in accordance with UVV/VBG 103 before sterilization and maintained (e.g. by oiling).

The disinfection must be made similarly strict national codes of practice in a disinfectant and/or cleaning solution at the correct concentration for the correct length of time.

MELAG recommends the use of cleaning aids such as ultrasonic baths, cleaning and maintenance equipment, as well as thermo-disinfecting devices.

It is essential that the instruments are well cleaned in order to avoid dirt and contamination being separated from the load in the autoclave and clogging filters, valves, and nozzles. In particular locks, joints, and hinges must be cleaned thoroughly with a brush before sterilization. No traces of cleaning and disinfecting agents should be allowed to enter into the sterilization chamber of the autoclave, since this can give rise to corrosion! The instruments should be swilled off with demineralized water and then dried off before being loaded in the autoclave. All instruments must be treated in accordance with the manufacturer's instructions in order to ensure their long working life.

Brand-new instruments

The cleaning procedures described above must also be followed before sterilizing brand-new instruments. These often carry small amounts of grease, oil and soiling from the manufacturing process.

Important: Carefully follow all instructions provided by manufacturers of instruments for the preparation of their products for first-time sterilization and for subsequent sterilizations.

8.2 Rust formation = Drag-in rust

As already explained, the non-rusting materials used in the autoclave cannot cause rust formation in the autoclave!

Where rust forms this is "drag-in rust". This originates from instruments or other metal items carrying traces of rust, even though they are made of stainless steel, or which are made of normal steel but which have a damaged galvanic coating. Often, a single rusty instrument is enough to pass rust on to other instruments or to lead to film rust forming in the autoclave resulting to corrosion damage. Drag-in rust must be removed from the affected instruments or from the autoclave and tray assembly using a mild commercial cleaning agent for stainless steel. (This should not contain of chlorine). Do not use steel wool, a wire brush or other abrasive cleaners! Spots can be removed with a damp, lint-free cloth or a cloth with surgical spirits or alcohol.

8.3 Taking care of the MELA*tronic*®15EN, 17EN and 23EN

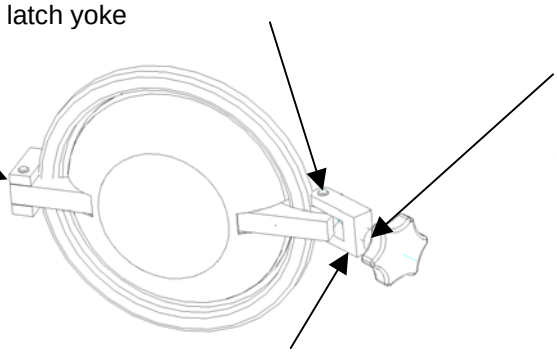
8.3.1 Cleaning the autoclave

The **tray rack** and the autoclave **chamber** including the contact area of the door gasket and the door opening should be inspected thoroughly at least once a week for signs of damage or soiling. If necessary, wipe out the autoclave chamber using a **lint-free cloth** and surgical spirits. This involves withdrawing the trays and tray guide assembly. Stubborn spots can be removed using small amounts of a mild commercial steel cleaning agent (pH-levels from 5 to 8). Care must be taken to ensure that cleaning agent does not get into the pipes attached to the autoclave chamber. The cleaning agent must not contain chlorine and should not be alkaline. Do not use abrasive cleaning pads, steel wool, or brushes.
Inspect the door gasket every week for signs of damage and soiling, and if necessary clean it with a mild commercial liquid cleaning agent (pH-levels from 5 to 8) or with surgical spirits. If necessary, the gasket can be removed.
The bolt of the door lock (right side), the threads of the door latch and the door grip and the door hinge (left side) must be regularly lubricated with silicone grease (MELAG Art.No. 24355), in order to ensure that the door can easily be locked and unlocked, without unnecessary wear.
The outer parts of the autoclave can be cleaned with a mild commercial cleaning agent or with surgical spirits.
If water is supplied from and returned to the internal tank, then this should be inspected before refilling with distilled / demineralized water. Whenever necessary it should be cleaned. The water storage tank should be emptied by opening the water drain tap (Fig. 1 Pos.6) at least every two weeks and washed out with clear water. Hard stains and oily residues may have to be removed using a little washing-up liquid and warm mains-supply water with a suitable soft brush, followed by swilling with distilled / demineralized water. Should the right tank need cleaning after a lengthy period of close-loop operation then this should be cleaned in the same way, and also thoroughly swilled.
Clean the **conductivity sensor** (Fig. 1 Pos. 14) inside the water storage tank with alcohol and rinse the tank with clear water before refilling the storage tank with fresh aqua dest / aqua dem.
The autoclaves MELA*tronic*®15EN, 17EN, and 23EN operate with easily accessible filters. The condition of these filters is very important for the proper functioning of the autoclave. Please service the filters as follows:
If you are operating the autoclave with a water-circulation system, then clean the **water supply filter in the water storage tank** (Fig. 1 Pos. 17) once a week. If you are operating your autoclave with a single-use (non-reusable) water system, the water supply filter must be cleaned once a month. To clean the filter, drain the water from the water storage tank and unscrew the coupling ring of the filter. Clean the filter insert, and replace it in the water tank. Secure with the coupling ring. If there are visible defects to the filter (such as tears or holes), then replace the filter.
If you are operating the autoclave with a water-circulation system, then clean the **water supply/pressure-relief filter** in the sterilization chamber once every three (3) months. If you are operating your autoclave with a single-use (non-reusable) water system, then clean the water supply/pressure-relief filter once every six (6) months. To clean these filters, use the filter spanner (wrench) to unscrew the slotted round nut on the cover plate of the heating unit. Take off this cover plate. Now use the right-angle side of the filter spanner to unscrew the water supply/pressure-relief filter. To clean the filter, remove the sieve insert from the filter housing, and clean the insert and the housing. Then re-assemble the filter in the reverse order. If the filter insert is damage, defective, or corroded, replace it.
Once a month, use the filter spanner (wrench) to remove **the flow filter in the sterilization chamber**. Clean the filter and re-install it.

8.3.2 Instructions for checking and caring for the door and door-lock components

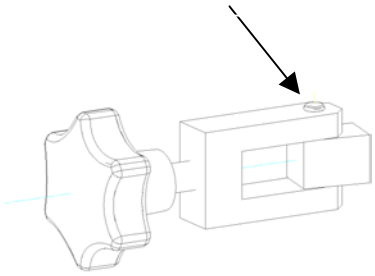
In order to prevent premature wear, the threaded spindle of the palm grip hand knob, as well as the hinges of the latch yoke and the door locking bar, must always be kept well greased. We recommend plain-bearing grease (MELAG article no. 24355), silicone grease, or Molykote.
The following drawings indicate trouble that may occur and that may be the result of excessive wear on the door locking system. If any of these difficulties occur, inspection will be necessary by a MELAG Customer Service representative, or by an authorized technician from a specialist dealer.

- Excessive play in the hinge of the latch yoke
- Excessive play in the hinge of the pressure locking bar (the door “hangs”)
- Excessive play in the threaded spindle of the palm grip hand knob (rattling of the spindle in the latch)
- Definite difficulty in turning the threaded spindle

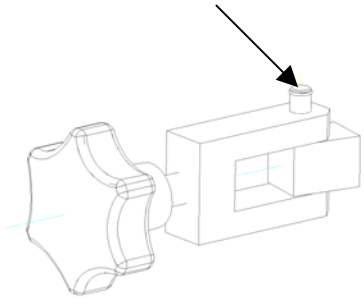


- Hard-metal screw-thread insert has been screwed out of the latch.

Important:
The hinge bolts must by all means remain inserted completely in the latch and in the hinge yoke of the pressure locking bar (left side).
The bolt must be flush as shown.



If this bolt moves up or downward and is no longer flush with the yoke (as shown in proper position in left drawing), do not use the autoclave. It must be repaired by Technical Customer Service personnel.



8.3.3 Use of demineralized or distilled water

Quality requirements
For steam sterilization it is necessary to use high quality distilled or demineralized water.
The water used should at least comply with the specifications in accordance with CEN-standard EN 285 listed in the table below.
For the operation of the MELA*tronic*®15EN, 17EN and 23EN, however, **battery water in accordance with VDE 510** is sufficient, as long as the VDE specifications are strictly adhered to (conductivity on production ≤ 10 µS/cm*), when used ≤ 30 µS/cm*), pH-value identical with EN 285, evaporation residues analogous).
Where to purchase the water
Battery water in accordance VDE 510 is widely available in large drug stores, supermarkets and do-it-yourself stores at low prices. The necessary purity standards must be expressly detailed on the label, because with insufficiently pure water calcium scaling could form in the steam lines and valves, restricting the operation of the autoclave. Aggressive water (pH < 5 or > 7) can also lead to damage in the autoclave.
Formation of spots on instruments
The extent to which spots form on the instruments depends on the quality of the water used to produce the steam.
Specifications for water quality in accordance with the EN 285

Evaporation residue	≤	10	mg/l
Silicon oxide, SiO_2	≤	1	mg/l
Iron	≤	0.2	mg/l
Cadmium	≤	0.005	mg/l
Lead	≤	0.05	mg/l
Other heavy metals	≤	0,1	mg/l
Chlorides (Cl)	≤	2	mg/l
Phosphates (P_2O_5)	≤	0.5	mg/l
Conductivity at 20°C	≤	15	µS/cm *)
pH (degree of acidity)	5 bis 7		
Appearance	Colourless; clean; without sediment		
Hardness (Σ of ions of alkaline earth)	≤	0,02	mmol/l

*) µS/cm = Micro Siemens per centimetre

8.4 Checking the operation of the autoclave

8.4.1 Safety with automatic monitoring

The electronic parameter control means that all relevant parameters are constantly monitored and compared with standard process data, so that error reports can be made immediately. If a program is completed without problems then on its completion there is an "End" message. The print-out contains a corresponding report.
The operator of the autoclave can check the progress of the program at any time by means of the values shown on the display (or after its completion by means of the print-out).

8.4.2 Periodical bacteriological testing (twice a year)

"Periodical testing shall be carried out at the place of installation, e.g. at 6 monthly intervals. They shall demonstrate that sterilization is carried out satisfactorily when the operating instruction for the small sterilizer are followed."
Hygiene institutes and regional medical test centres can supply test spores on request and document the results of sterilization on a test form.

8.4.3 Maintenance recommendations

Regular maintenance of the autoclave is important if it is to have a long life and remain in good working order.
MELAG recommends that the MELA*tronic*®15EN, 17EN and 23EN be serviced biennially by a trained technician in accordance with maintenance instructions for this autoclave. The biennial service includes a visual inspection and a test of operational functions. As well as all essential components and electrical elements, parts are also inspected for wear and replaced as necessary.
A maintenance reminder appears on the display every two years or after 1000 sterilizations.

9 Annex

9.1 Capacity / Weight

	Tray rack	Trays	Sterilization containers
MELA*tronic*®15EN	MELAG Art.-No. 40018	Max. 3 Trays MELAG Art.-No. 150	4 x 15 K 2 x 15 M 1 x 15 G
MELA*tronic*®17EN	MELAG Art.-No. 40024	Max.3 Trays MELAG Art.-No. 170	4 x 17 K 2 x 17 M 1 x 17 G 2x 17 R
MELA*tronic*®23EN	Mount A MELAG Art.-No. 40248 Foilenholder MELAG Art.-No. 00283	Alternative max. 6 Trays MELAG Art.-Nr. 230 or 3 standard tray cassettes MELAG Art.-No.: 00289	4 x 23 K 2 x 23M 1 x 23 G 2x 17 R

9.2 Performance of the sterilization programs according to EN 13060

	Sterilization programs			
	„Universal-Program“	„Prion-Program“	„Gentle-Program“	„Quick-Program“
Type acc. to EN 13060	S	S	S	N
Type tests (executed according to EN 13060				
Dynamic Pressure test of the chamber	**X**	**X**	**X**	
Empty chamber	**X**	**X**	**X**	**X**
Residue air	**X**	**X**	**X**	**X**
Massive Load unwrapped	**X**	**X**	**X**	**X**
Massive Load Single wrapped	**X**	**X**	**X**	
Additional tested load (Textiles small amount see section 1.3, single wrapped)				
Porous load Beladung Single wrapped	**X**	**X**	**X**	

9.3 Additional technical data

	MELAtronic®15EN	MELAtronic®17 EN	MELAtronic®23 EN
Dimensions:			
Outside dimensions (B x H x T) in cm:	44 x 33 x 50	46 x 35 x 55	52 x 38 x 590
Chamber dimensions (Ø x Depth):	15 x 38 cm	18 x 42 cm	23 x 45 cm
Volume of chamber:	7 Litres	11 Litres	19 Litres
Weight (without load / water):	22 Kg	25 Kg	32 Kg
External supplies:			
Power supply:	230 V AC / 50 Hz		
Rating:	1500 W / 6.5 A	1500 W / 6.5 A	1600 W / 7 A
Feed water	Demineralized / distilled water according to VDE 0510		
Maximum loads:			
Instruments wrapped / unwrapped	2 Kg	3 Kg	4 Kg
Textiles wrapped	100 Gr.	150 Gr.	200 Gr.
Textiles unwrapped	150 Gr.	300 Gr.	500 Gr.
Process parameters:			
Energy consumption in Stand-By	130 Wh	140 Wh	230 Wh
Noise emmission	< 58 dBA		
Universal program 2.1 bar / 134 °C			
Energy consumption	250 Wh	360 Wh	450 Wh
Feed water (One-way)	370 ml	420 ml	450 ml
Program running time Cold start max. load / Warm start small amount of load	21 - 27 min	26 - 33 min	30 - 38 min
Quick program 2.1 bar / 134 °C			
Energy consumption min. / max.:	200 Wh	280 Wh	360 Wh
Feed water min. / max.:	260 ml	300 ml	340 ml
Program running time Cold start max. load / Warm start small amount of load	17 - 22 min	19 - 26 min	21 - 29 min
Gentle program 1.1 bar / 121 °C			
Energy consumption min / max.:	300 Wh	420 Wh	470 Wh
Feed water min. / max.:	400 ml	450 ml	500 ml
Program running time Cold start max. load / Warm start small amount of load	37 - 44 min	42 - 52 min	47 - 59 min
Prion program 2.1 bar / 134 °C			
Energy consumption min. / max.:	350 Wh	520 Wh	550 Wh
Feed water min. / max.:	400 ml	430 ml	480 ml
Program running time Cold start max. load / Warm start small amount of load	36 - 42 min	41 - 48 min	45 - 53 min

The above mentioned Values for Energy- and Water consumption and for the program running times are average values and can differ in depending on the installation conditions in the practice (Power supply / Voltage / Room termperature / Loading of the autoclave).